

## Patent Claims

- 5      1. Cooling system (10, 110) for the cooling of heat producing devices (44, 46, 48) in an aircraft, with
  - a central cold producing device (12),
  - at least one cold consumer (44, 46, 48) and
  - a cold conveyance system (14) which connects the cold producing device (12) and the cold consumers (44, 46, 48),10      whereby the cold conveyance system (14) has at least one cooling circuit which supplies cooled cold carrier medium from the cold producing device (12) to the at least one cold consumer (44, 46, 48) and brings this back to the cold producing device (12), and whereby the at least one cold consumer (44, 46, 48) is supplied with cold produced in the cold producing device (12) by means of the cold carrier medium circulating in the cooling circuit.
- 15      2. Cooling system (10) in accordance with claim 1, characterised in that the cold producing device (12) has at least two cooling machines (18, 20) which work independently of one another and are coupled in parallel to the cold conveyance system (14).
- 20      3. Cooling system (10) in accordance with claim 1 or 2, characterised in that the number of cooling machines (18, 20) of the cold producing device (12) is chosen in such a way, that the cold requirement for the aircraft during ground operation is covered.
- 25      4. Cooling system (10) in accordance with any of the previous claims, characterised in that the at least one cooling machine (18, 20) uses air outside of the pressure cabin of the aircraft as a heat sink in order to expel heat, and the warm extracted air is expelled outside of the pressure cabin.
- 30      5. Cooling system (110) in accordance with any of the previous claims, characterised in that a number of cooling circuits (125, 127), which are essentially independent of one another, are provided.

- 5        6. Cooling system (10) in accordance with claim 5,  
characterised in that a cooling circuit (125, 127) is provided on each side of the  
aircraft in relation to a longitudinal axis of the aircraft and/or one cooling circuit in a  
front half and one in the rear half of the aircraft.
- 10      7. Cooling system (10) in accordance with claim 6,  
characterised in that cold consumers (166, 168, 170, 172, 174, 176) positioned in  
the centre of the aircraft are supplied with cold carrier medium from at least two  
cooling circuits (125, 127).
- 15      8. Cooling system (110) in accordance with any of the claims 5 to 7,  
characterised in that each cooling circuit (125, 127) has at least one cold carrier  
pump (132, 134, 156, 158) for the circulation of cold carrier medium.
- 20      9. Cooling system (110) in accordance with claim 8,  
characterised in that at least two cold carrier pumps (132, 134, 156, 158), which are  
assigned to one and the same cooling circuit (125, 127), are supplied with electric  
energy independently of one another.
- 25      10. Cooling system (110) in accordance with any of the claims 5 to 9,  
characterised in that at least one storage unit (140, 160) for the intermediary storage  
of cold carrier medium is assigned to each cooling circuit (125, 127).
- 30      11. Cooling system (110) in accordance with any of the claims 5 to 10,  
characterised in that at least two cooling circuits (125, 127) are thermally coupled to  
a cold consumer by means of the cold producing device and/or by means of a heat  
exchanger.
- 35      12. Cooling system (10) in accordance with any of the previous claims,  
characterised in that at least one cold consumer (44, 46, 48) has a secondary cold  
conveyance system in which cold is transferred from the cold carrier medium by  
means of a secondary cold carrier, preferably air.

- 5        13. Cooling system (10) in accordance with any of the previous claims,  
characterised in that a central control unit is provided which, dependent upon at least  
one of the specified parameters for the current cold requirement, the cold output is  
controlled in each of the cooling circuits.
- 10      14. Cooling system (10) in accordance with claim 13,  
characterised in that the parameters which specify the current cold requirement  
reflect the temperature of the cold carrier medium at at least one point in the cooling  
circuit, preferably at least the output temperature of the cold carrier medium from  
the cold carrier pump, and/or information about the cold requirement of at least one  
cold consumer (44, 46, 48) and/or the pressure of the cold carrier medium in the  
cooling circuit in question.
- 15      15. Cooling system (10) in accordance with any of the previous claims,  
characterised in that the cold output is controlled so as to adapt to the current cold  
requirement in the aircraft by means of turning individual cooling machines (18, 20)  
of the cold producing device (12) on and off.
- 20      16. Cooling system (10) in accordance with any of the previous claims,  
characterised in that a check valve and a bypass line which bypasses the cooling  
machine is assigned to each cooling machine.
- 25      17. Cooling system (10) in accordance with claim 13 and another of the previous  
claims,  
characterised in that the cold output of at least one cooling machine (18, 20) is  
controllable, preferably continuously, by means of the control unit.
- 30      18. Cooling system (10) in accordance with claim 13 and another of the previous  
claims,  
characterised in that the control unit records the output temperature of the cold  
carrier medium leaving the cooling machine (18, 20) and controls the cooling  
machine (18, 20) in accordance with the output temperature measured and  
recorded.

19. Cooling system (10) in accordance with claim 18,  
characterised in that the cold output of at least one cooling machine (18, 20) can be  
changed by means of a bypass valve and/or by varying the revolutions per minute of  
a compressor used in the cooling machine (18, 20).

20. Cooling system (10) in accordance with claim 13 and another of the previous  
claims,

characterised in that the control unit for the control of the cold output of the cooling  
system (10) changes the quantity of cold carrier medium supplied in the cooling  
circuit in question.

21. Cooling system (10) in accordance with claim 20,  
characterised in that the control unit for the control of the cold output changes the  
revolutions per minute of at least one cold carrier pump (32, 34) in the cooling circuit  
in question.

22. Cooling system (110) in accordance with any of the previous claims,  
characterised in that each cooling circuit (125, 127) is supplied with electric energy,  
independently of at least one other cooling circuit (125, 127).

23. Aircraft with a cooling system in accordance with any of the previous claims.